

Docket No.0054.98

We claim:

1. A process comprising:

(a) providing wastewater having at least reduced levels of carbonate and ammonium buffers to a reactor vessel, and

(b) adding an alkaline earth metal compound to said wastewater to precipitate phosphate.

2. The process of claim 1 wherein said alkaline earth metal compound is selected from the group consisting of calcium hydroxide, magnesium hydroxide, calcium oxide, magnesium oxide, and mixtures thereof.

3. A process comprising

(a) providing nitrified wastewater to a reactor vessel,

(b) adding an alkali to said nitrified wastewater to increase pH of said nitrified wastewater to at least about pH 9, and

(c) adding a metallic-containing salt or hydroxide to said wastewater having a pH of at least about pH 9 to precipitate phosphate.

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4. The process of claim 1 further comprising recovering said phosphate.

5. The process of claim 3 wherein said metallic-containing salt or hydroxide is an alkaline earth metal-containing salt or hydroxide.

6. The process of claim 5 wherein said alkaline earth metal in said alkaline earth metal-containing salt or hydroxide is selected from the group consisting of calcium, magnesium, and mixtures thereof.

7. The process of claim 3 wherein said metallic-containing salt or hydroxide contains a metallic element selected from the group consisting of sodium, potassium, and mixtures thereof.

8. A process for removing soluble phosphorus from animal wastewater comprising:

(a) providing wastewater to a nitrification reactor vessel to produce nitrified wastewater,

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(b) flowing said nitrified wastewater to a separate reactor vessel and adding alkali to said nitrified wastewater to increase the pH of said nitrified wastewater to at least about pH 9, and

(c) adding calcium or magnesium salts to precipitate soluble phosphorous to produce an effluent with a predefined nitrogen:phosphorus ratio.

9. The process of claim 8 wherein alkali and calcium or magnesium salts are added at rates to produce an effluent having a nitrogen:phosphorus ratio which meet the needs of a specific crop.

10. The process of claim 8 wherein alkali and calcium or magnesium salts are added at rates to produce an effluent having a nitrogen:phosphorus ratio to remediate phosphorus contaminated spray fields.

11. The process of claim 8 further comprising using said effluent for surface or subsurface irrigation.

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12. The process of claim 8 further comprising using said effluent in a constructed wetland to facilitate denitrification of said effluent.

13. A process for at least reducing the presence of infectious microorganisms in wastewater comprising:

(a) providing wastewater to a nitrification reactor vessel to produce nitrified wastewater, and

(b) flowing said nitrified wastewater to a separate reactor vessel and adding alkali to said nitrified wastewater to increase the pH of said nitrified wastewater to at least about pH 9 and at least reducing the presence of infectious microorganisms.

14. The process of claim 13 further comprising adding calcium or magnesium salts to precipitate soluble phosphorous to produce an effluent with a predefined nitrogen:phosphorus ratio and at least reduced levels of infectious microorganisms.

15. The process of claim 14 further comprising flowing said effluent into a constructed wetland.

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16. The process of claim 13 wherein said infectious microorganisms are selected from the group consisting of enteropathogenic bacteria, picarnovirus, and mixtures thereof.

17. A system for wastewater treatment comprising:

a primary settling unit,

a nitrification bioreactor unit in fluid communication with said aeration unit,

and a phosphorus separation unit in fluid communication with said nitrification bioreactor unit.

18. The system of claim 17 further comprising an aeration unit in fluid communication with said primary settling unit and said nitrification unit.

19. The system of claim 18 further comprising a sedimentation unit in fluid communication with said aeration unit and said nitrification bioreactor unit.

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20. The system of claim 16 wherein said primary settling unit is a lagoon.

21. A system for wastewater treatment comprising:

a solid separation unit,

an aeration unit in fluid communication with said solid separation unit,

a nitrification bioreactor in fluid communication with said aeration unit, and

a phosphorous separation reactor unit in fluid communication with said nitrification bioreactor.

22. The system of claim 21 wherein flocculants are used in said solid separation unit to clump suspended solids and increase separation efficiency of said separation unit.

23. The system of claim 21 further comprising a sedimentation unit in fluid communication with said aeration unit and said nitrification bioreactor unit.

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- a. solid separation unit,
- b. a denitrification unit in fluid communication with said solid separation unit,
- c. a nitrification unit in fluid communication with said denitrification unit, and
- d. A phosphorus separation reactor unit in fluid communication with said nitrification unit.

25. The system of claim 24 further comprising a clarification unit in fluid communication with said nitrification unit and said phosphorus separation unit.

26. The system of claim 24 wherein flocculants are used in said separation unit to clump suspended solids and increase separation efficiency of said separation unit.